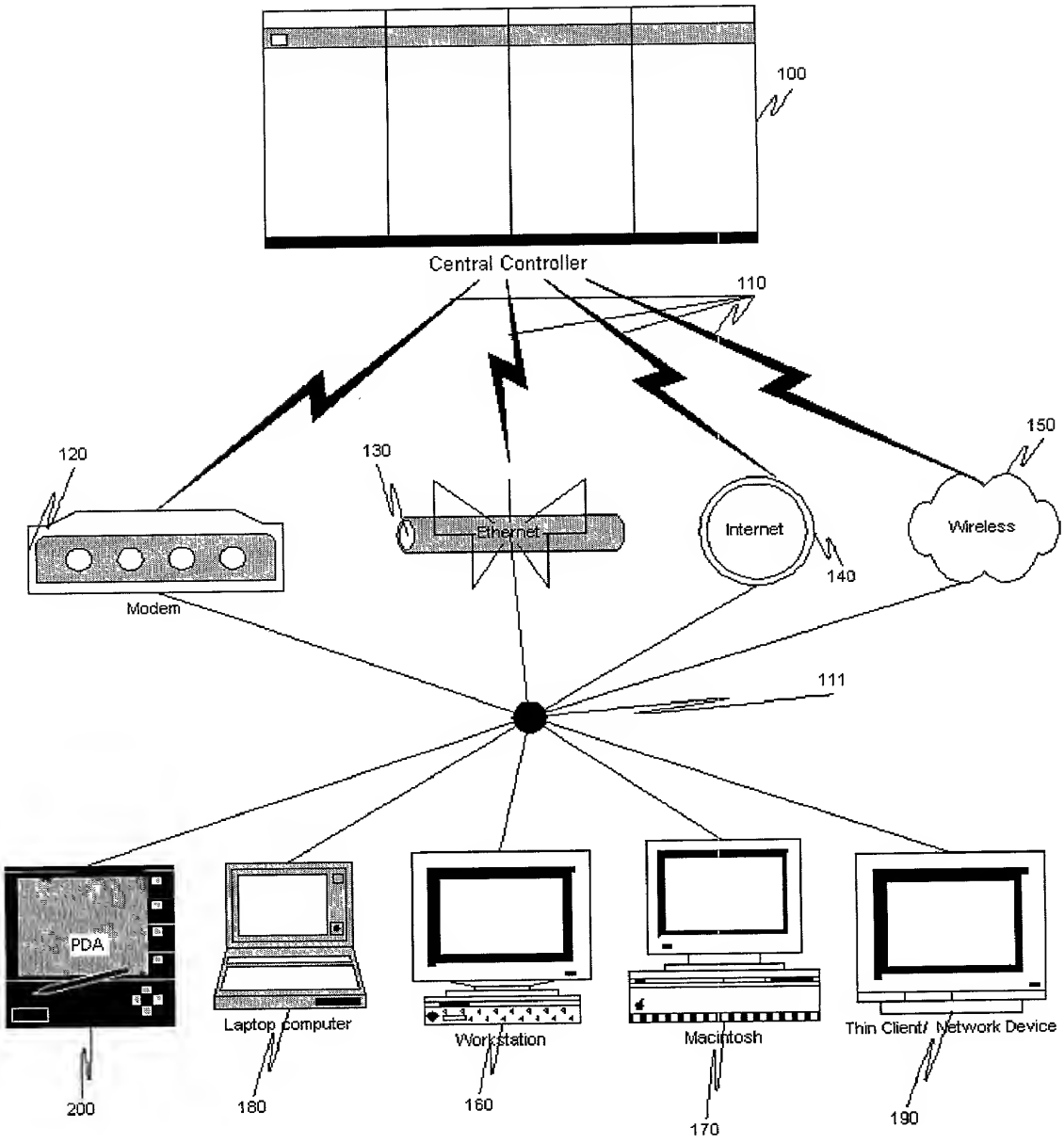

100
Central Controller
110
120
130
150
Modem
Ethernet
Internet
140
Wireless
111
PDA
Laptop computer
Workstation
Macintosh
Thin Client/ Network Device
200
180
160
170
190

FIG. 1

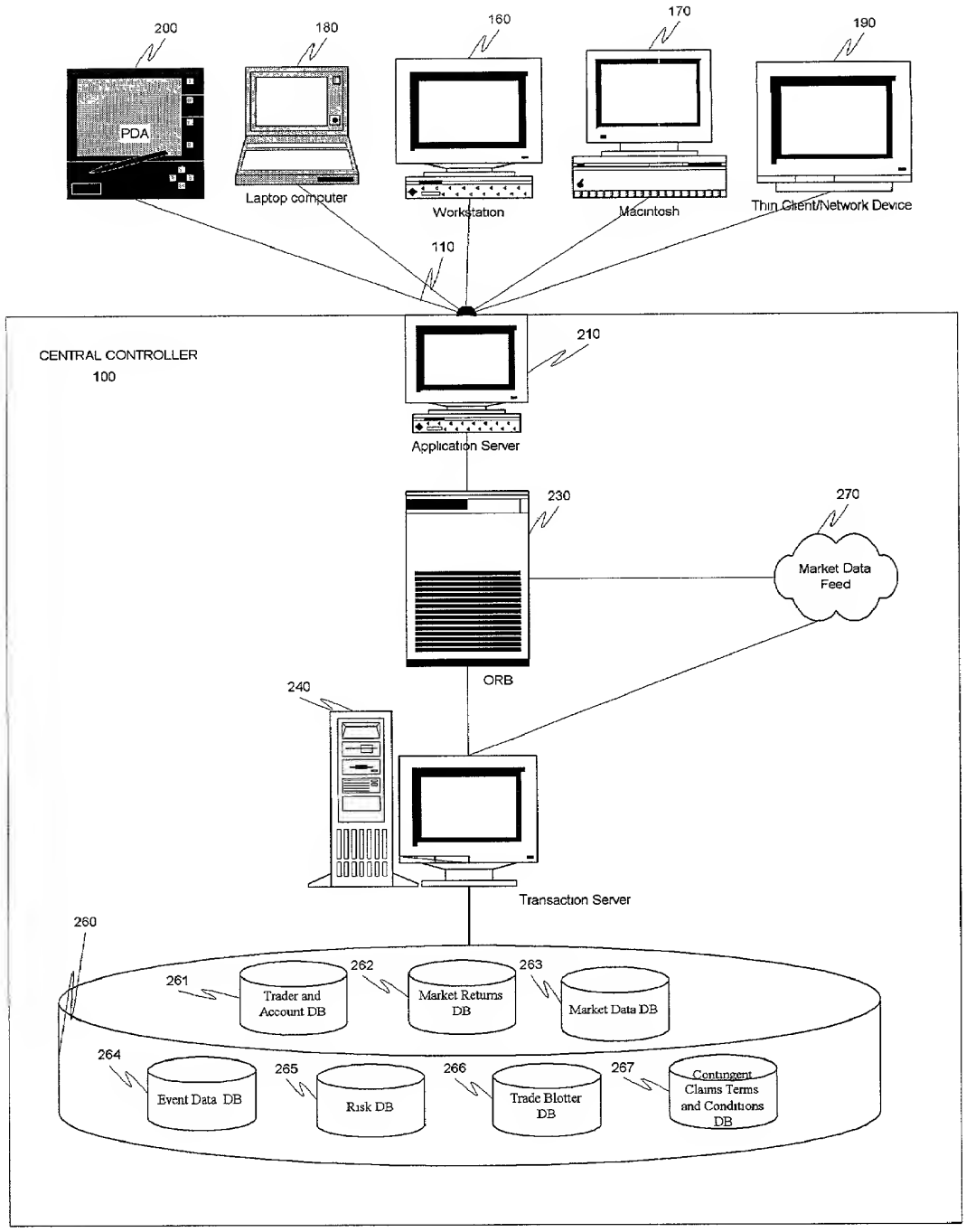

200
PDA
180
Laptop computer
160
Workstation
170
Macintosh
190
Thin Client/Network Device
110
CENTRAL CONTROLLER
100
210
Application Server
230
ORB
270
Market Data Feed
240
Transaction Server
260
261
Trader and Account DB
262
Market Returns DB
263
Market Data DB
264
Event Data DB
265
Risk DB
266
Trade Blotter DB
267
Contingent Claims Terms and Conditions DB

FIG. 2

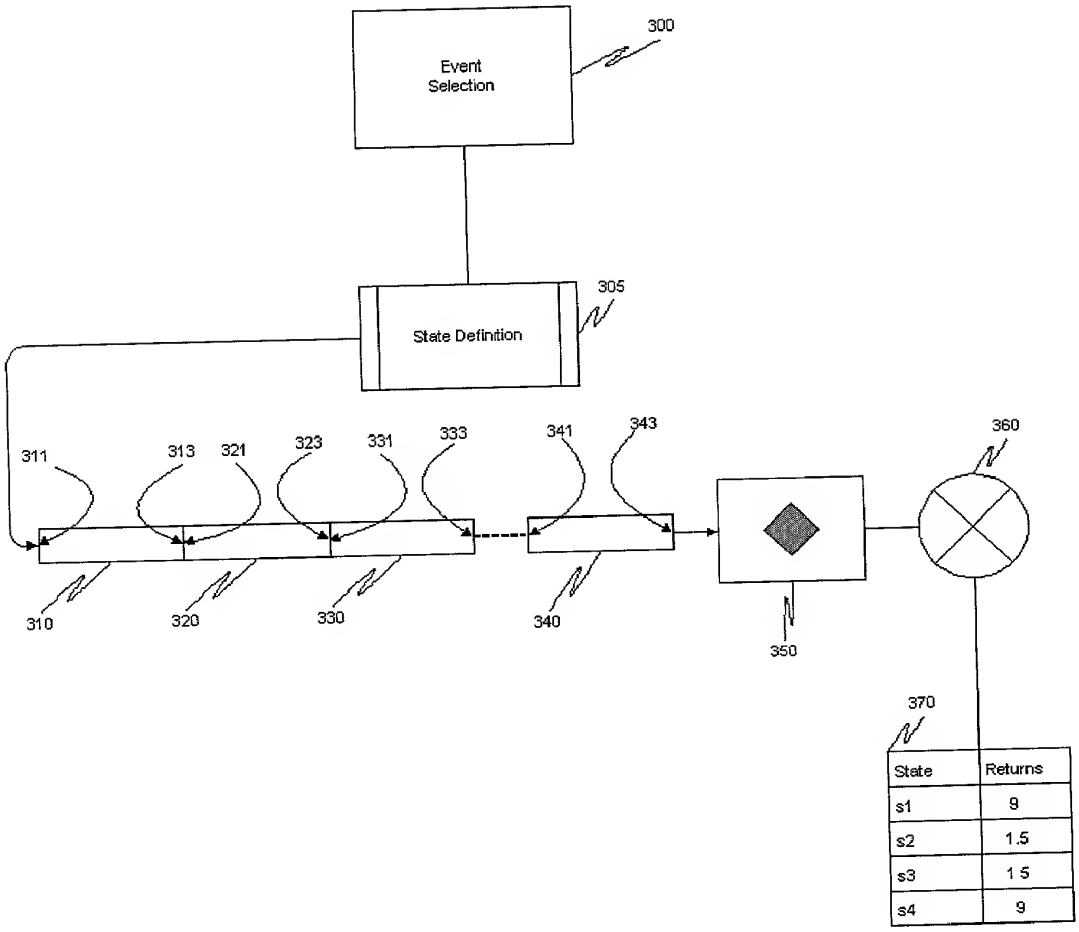

Event Selection
300
State Defintion
305
311
313
321
323
331
333
341
343
360
310
320
330
340
350
370
State
Returns
s1
9
s2
1.5
s3
1 5
s4
9

FIG. 3

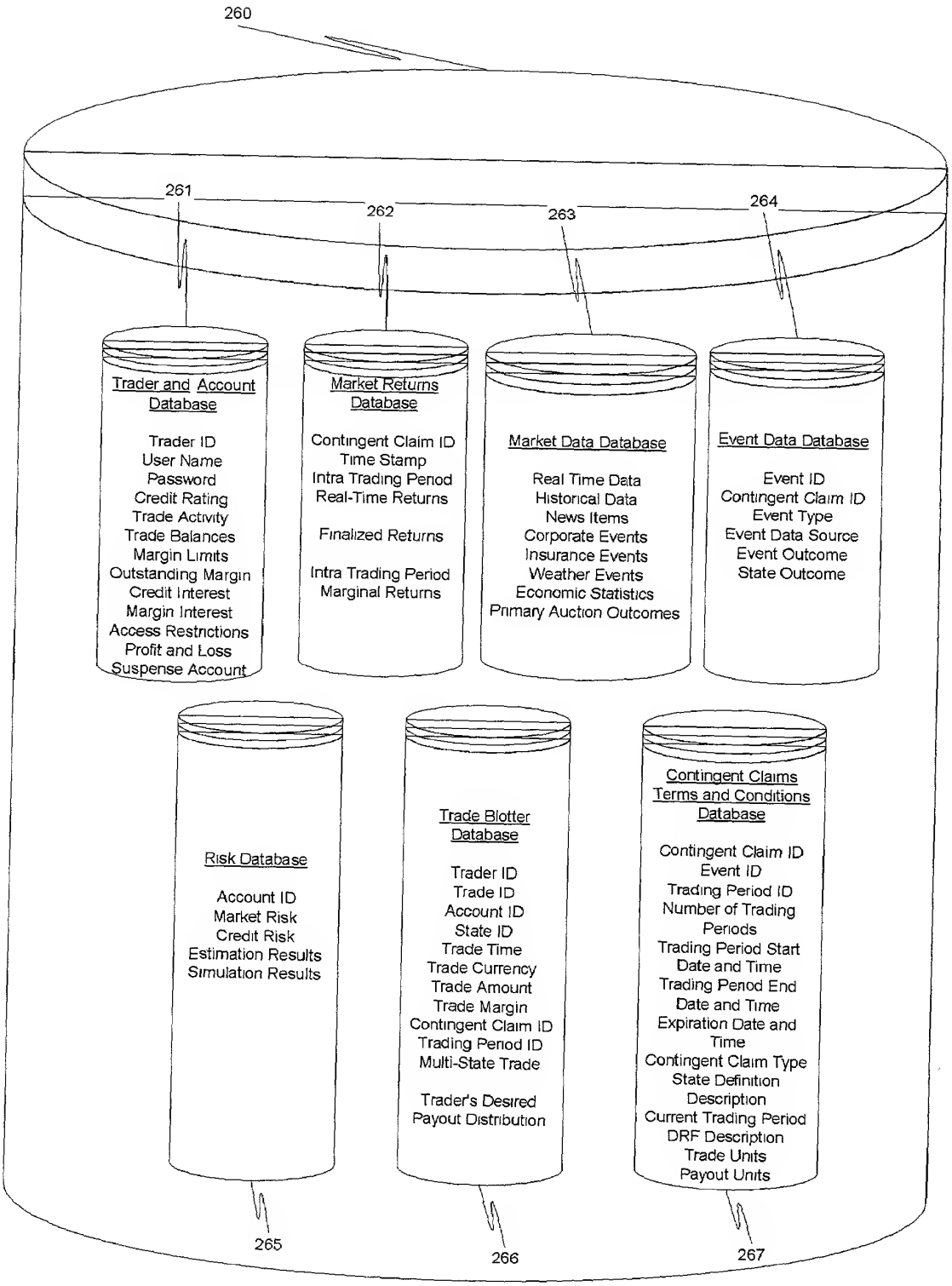

260
261
262
263
264
Trader and Account Database
Trader ID
User Name
Password
Credit Rating
Trade Activity
Trade Balances
Margin Limits
Outstanding Margin
Credit Interest
Margin Interest
Access Restrictions
Profit and Loss
Suspense Account
Market Returns Database
Contingent Claim ID
Time Stamp
Intra Trading Period
Real-Time Returns
Finalized Returns
Intra Trading Period
Marginal Returns
Market Data Database
Real Time Data
Historical Data
News Items
Corporate Events
Insurance Events
Weather Events
Economic Statistics
Primary Auction Outcomes
Event Data Database
Event ID
Contingent Claim ID
Event Type
Event Data Source
Event Outcome
State Outcome
Risk Database
Account ID
Market Risk
Credit Risk
Estimation Results
Simulation Results
Trade Blotter Database
Trader ID
Trade ID
Account ID
State ID
Trade Time
Trade Currency
Trade Amount
Trade Margin
Contingent Claim ID
Trading Period ID
Multi-State Trade
Trader's Desired Payout Distribution
Contingent Claims Terms and Conditions Database
Contingent Claim ID
Event ID
Trading Period ID
Number of Trading Periods
Trading Period Start Date and Time
Trading Period End Date and Time
Expiration Date and Time
Contingent Claim Type
State Definition
Description
Current Trading Period
DRF Description
Trade Units
Payout Units
265
266
267

FIG. 4

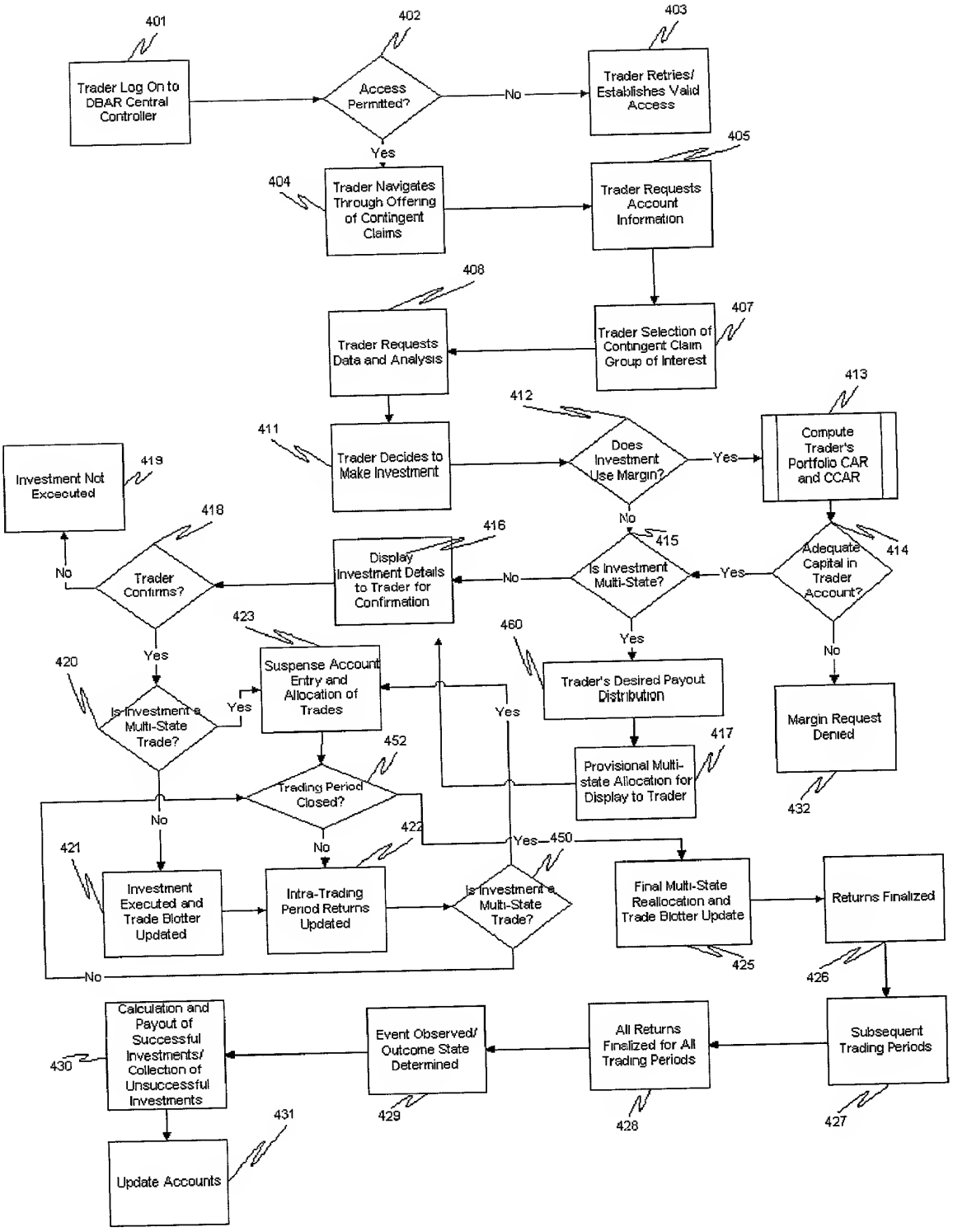

401
Trader Log On to DBAR Central Controller
402
Access Permitted?
No
403
Trader Retries/ Establishes Valid Access
Yes
404
Trader Navigates Through Offering of Contingent Claims
405
Trader Requests Account Information
408
Trader Requests Data and Analysis
407
Trader Selection of Contingent Claim Group of Interest
411
Trader Decides to Make Investment
412
Does Investment Use Margin?
Yes
413
Compute Trader's Portfolio CAR and CCAR
No
414
Adequate Capital in Trader Account?
Yes
415
Is Investment Multi-State?
No
416
Display Investment Details to Trader for Confirmation
No
418
Trader Confirms?
No
419
Investment Not Executed
Yes
423
Suspense Account Entry and Allocation of Trades
420
Is Investment a Multi-State Trade?
Yes
460
Trader's Desired Payout Distribution
Yes
417
Provisional Multi-state Allocation for Display to Trader
No
Margin Request Denied
432
452
Trading Period Closed?
No
Yes
422
Intra-Trading Period Returns Updated
421
Investment Executed and Trade Blotter Updated
450
Is Investment a Multi-State Trade?
Yes
No
Final Multi-State Reallocation and Trade Blotter Update
425
Returns Finalized
426
Subsequent Trading Periods
427
All Returns Finalized for All Trading Periods
428
Event Observed/ Outcome State Determined
429
Calculation and Payout of Successful Investments/ Collection of Unsuccessful Investments
430
Update Accounts
431

FIG. 5

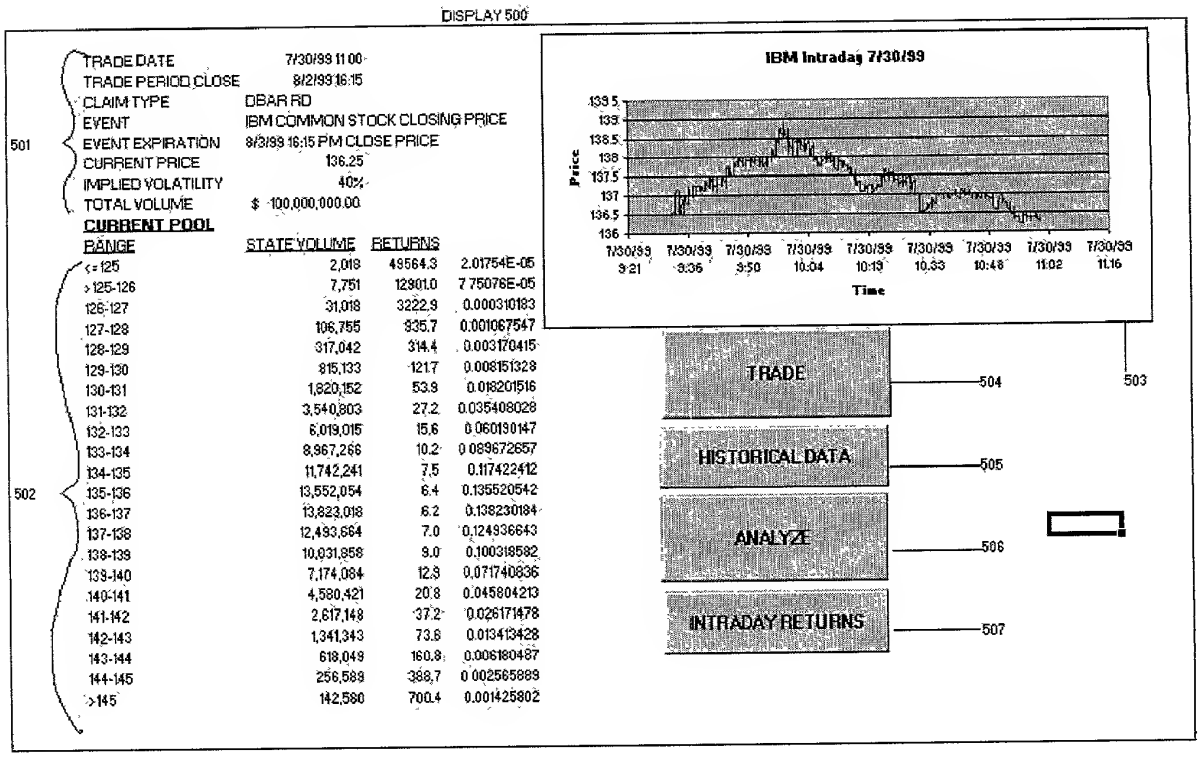

DISPLAY 500
TRADE DATE 7/30/99 11:00
TRADE PERIOD CLOSE 8/2/99 16:15
CLAIM TYPE DBAR RD
EVENT IBM COMMON STOCK CLOSING PRICE
501
EVENT EXPIRATION 8/3/99 16:15 PM CLOSE PRICE
CURRENT PRICE 136.25
IMPLIED VOLATILITY 40%
TOTAL VOLUME $ 100,000,000.00
CURRENT POOL
RANGE STATE VOLUME RETURNS
<=125 2,018 49564.3 2.01754E-05
>125-126 7,751 12901.0 7.75076E-05
126-127 31,018 3222.9 0.000310183
127-128 106,755 935.7 0.001067547
128-129 317,042 314.4 0.003170415
129-130 815,133 121.7 0.008151328
130-131 1,820,152 53.9 0.018201516
131-132 3,540,803 27.2 0.035408028
132-133 6,019,015 15.6 0.060190147
133-134 8,967,266 10.2 0.089672657
134-135 11,742,241 7.5 0.117422412
502
135-136 13,552,054 6.4 0.135520542
136-137 13,823,018 6.2 0.138230184
137-138 12,493,664 7.0 0.124936643
138-139 10,031,858 9.0 0.100318582
139-140 7,174,084 12.8 0.071740836
140-141 4,580,421 20.8 0.045804213
141-142 2,617,148 37.2 0.026171478
142-143 1,341,343 73.8 0.013413428
143-144 618,049 160.8 0.006180487
144-145 256,589 388.7 0.002565889
>145 142,580 700.4 0.001425802
IBM Intraday 7/30/99
Price
139.5
139
138.5
138
137.5
137
136.5
136
7/30/99 9:21
7/30/99 9:36
7/30/99 9:50
7/30/99 10:04
7/30/99 10:18
7/30/99 10:33
7/30/99 10:48
7/30/99 11:02
7/30/99 11:16
Time
503
TRADE
504
HISTORICAL DATA
505
ANALYZE
506
INTRADAY RETURNS
507

FIG. 6

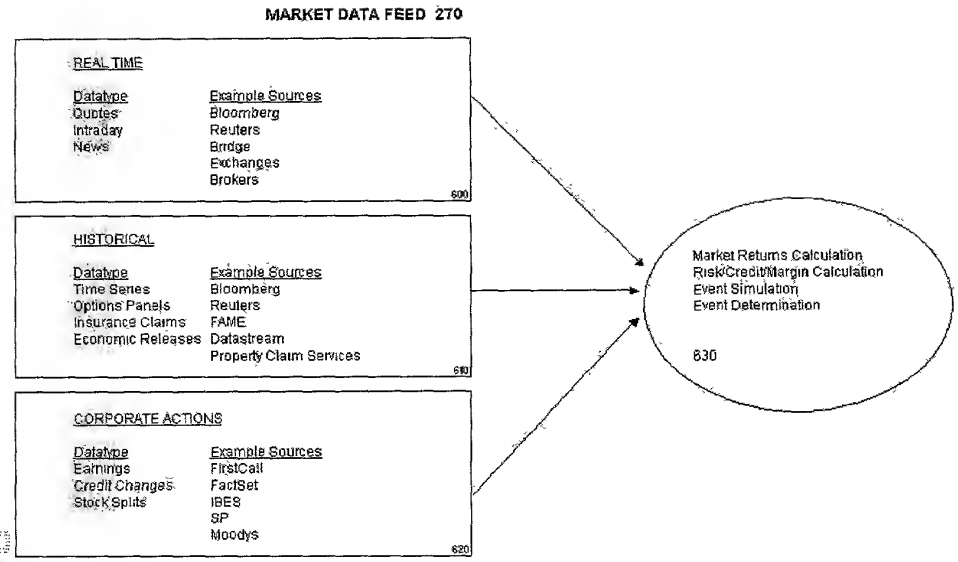

MARKET DATA FEED 270
REAL TIME
Datatype
Quotes
Intraday
News
Example Sources
Bloomberg
Reuters
Bridge
Exchanges
Brokers
600
HISTORICAL
Datatype
Time Series
Options Panels
Insurance Claims
Economic Releases
Example Sources
Bloomberg
Reuters
FAME
Datastream
Property Claim Services
610
CORPORATE ACTIONS
Datatype
Earnings
Credit Changes
Stock Splits
Example Sources
FirstCall
FactSet
IBES
SP
Moodys
620
Market Returns Calculation
Risk/Credit/Margin Calculation
Event Simulation
Event Determination
630

FIG. 7

Implied Liquidity Effects: Percentage Changes to Implied State Probabilities Between "Offer"and "Bid" as a Function of Proposed Investment Amount (as a percentage, p, of existing investment)

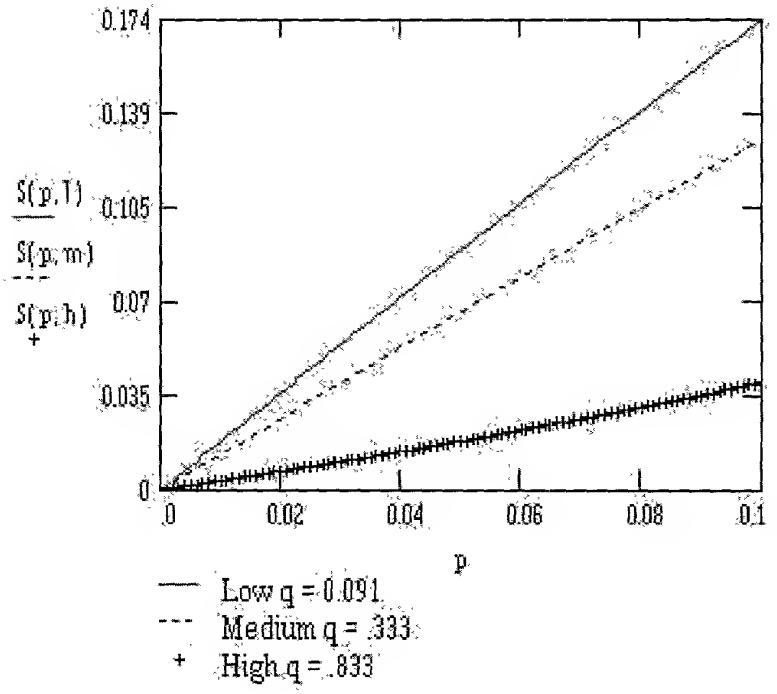


FIG. 8

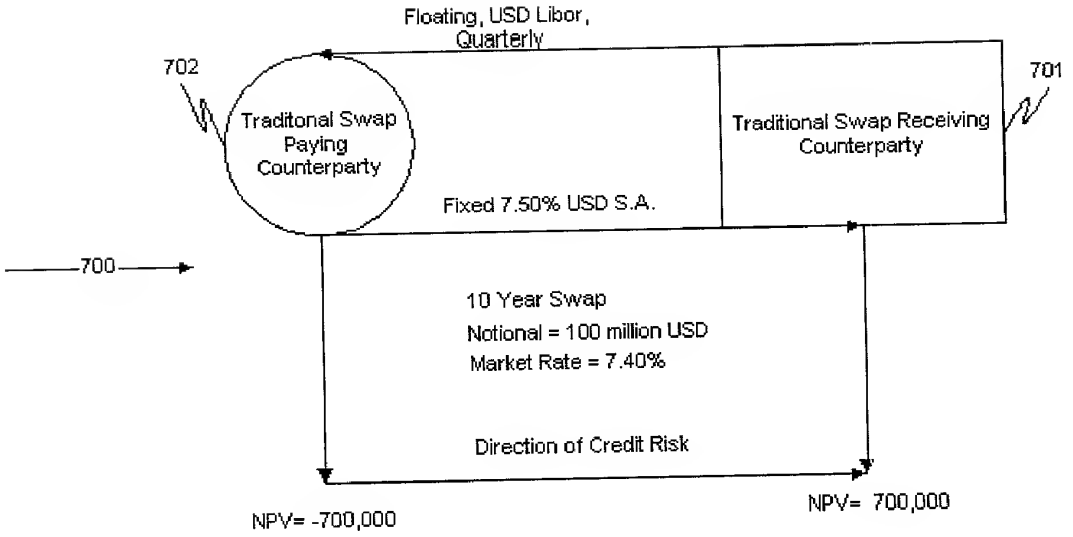


FIG. 9a: Traditional Swap Counterparties

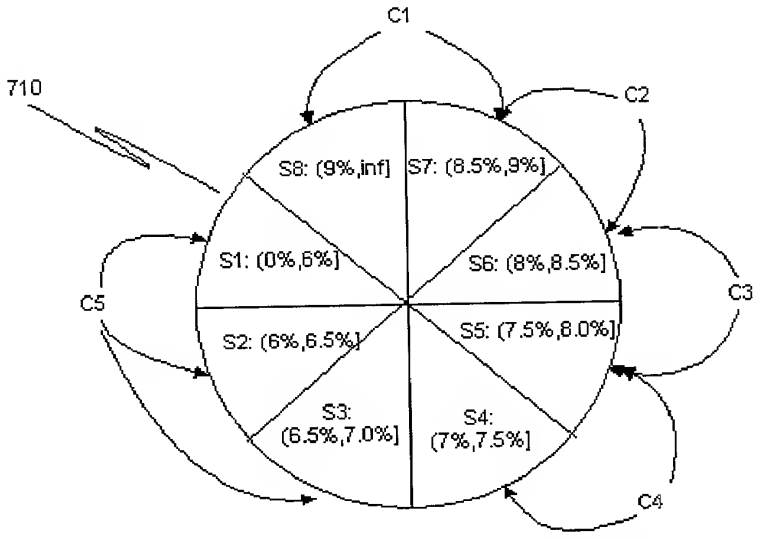


FIG. 9b: Illustrative Trader Relationships In DBAR Contingent Claims

720

States for Swap Rate

Counterparty and Credit Rating	S1	S2	S3	S4	S5	S6	S7	S8
C1,AAA							50,000	100,000
C2, AA						40,000	25,000	
C3, AA					100,000	60,000		
C4, A+				150,000	100,000			
C5, A	100,000	50,000	80,000					

FIG 9c: Margin Loans by Trader, Credit Rating, and Defined State

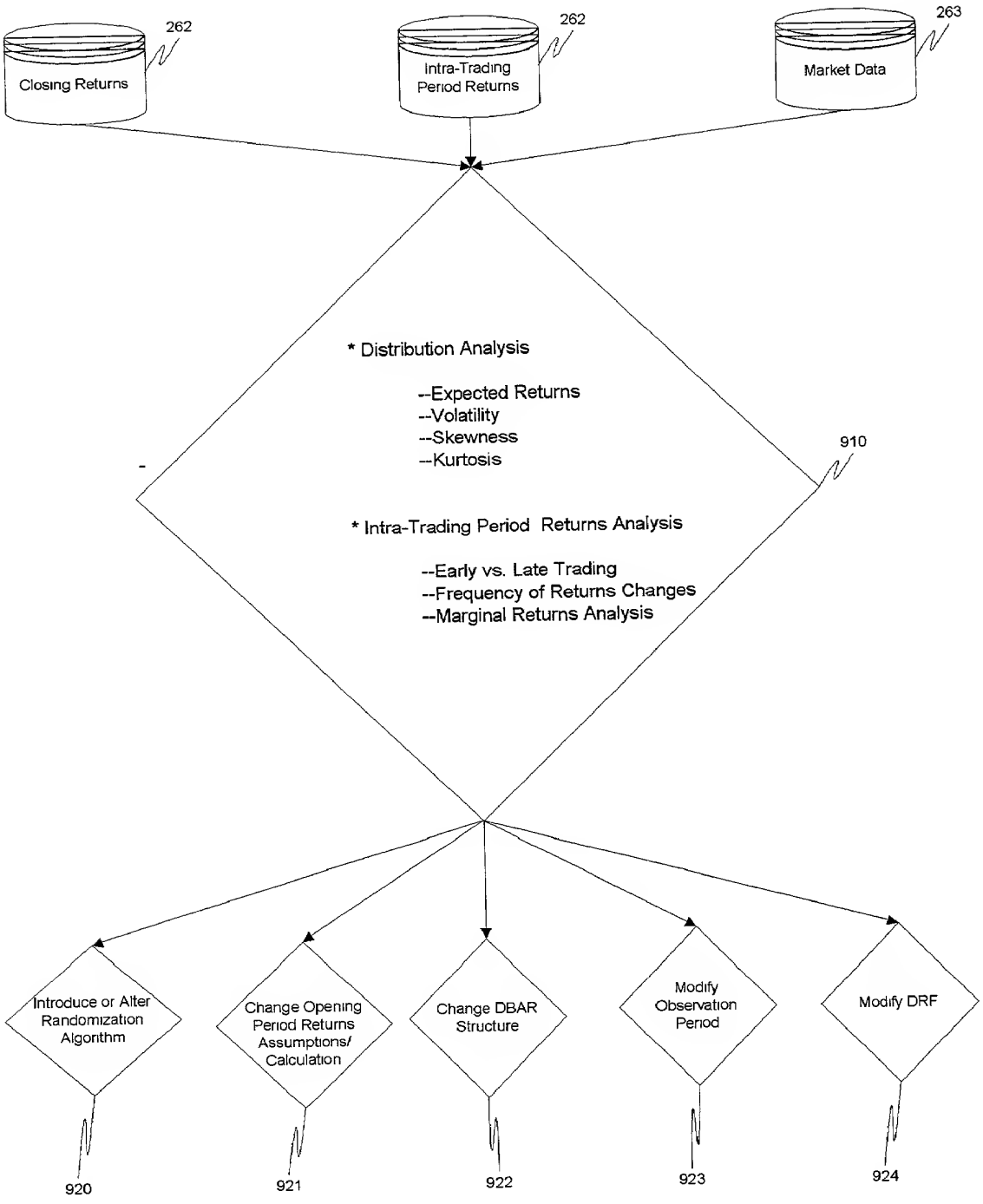

Closing Returns
262
Intra-Trading Period Returns
262
Market Data
263
* Distribution Analysis
--Expected Returns
--Volatility
--Skewness
--Kurtosis
* Intra-Trading Period Returns Analysis
--Early vs. Late Trading
--Frequency of Returns Changes
--Marginal Returns Analysis
910
Introduce or Alter Randomization Algorithm
Change Opening Period Returns Assumptions/ Calculation
Change DBAR Structure
Modify Observation Period
Modify DRF
920
921
922
923
924

FIG. 10

FIG. 11

```
struct {
    int       numStates;          // Number of states in contract
    double    totalInvested;      // Total amount invested in contract
    double    poTrade[];          // Profile trade investments per state
    double    poReturn[];         // Profile pay out per state
    double    stateTotal[];       // Aggregated investment per state
    int       numOrders           // Number of submitted orders in contract
    ORDER     orders[];           // List of composite orders
} contract;
```

1101

```
struct {
    double   orderAmount,          // Amount of trade to transact. Represents
                                   amount to to be invested for buys and amount
                                   of payout to be sold for sells
    double   invest[contract.numStates],  // Calculated amount to invest per
                                   state
    int      buySell               //Indicates whether order is a buy (=1) or a
                                   "sell" (=-1)
    int      marketLimit           // Indicates whether order is market order (=1)
                                   or a limit order (=0)
    double   limitPrice            // Price below (above) which buy (sale) shoul
                                   be executed
    double   price                 // the current equilibrium price for the digital
                                   option, spread or strip specified in the order
    int      ratio[contract.numStates]  // the relative payout ratio requested should
                                   each constituent state of order occur
    double   filled                // the amount of the order filled in equilibrium
    double   fee                   // the total transaction fee charged for the
                                   order
    double   payout                //the payout of the order net of fees after the
                                   event has occurred and the realized state is
                                   known
    double profilePayout[contract.numStates] //for a profile type order, the amount of
                                   desired payout should state i occur
} order;
```

1102

FIG. 12

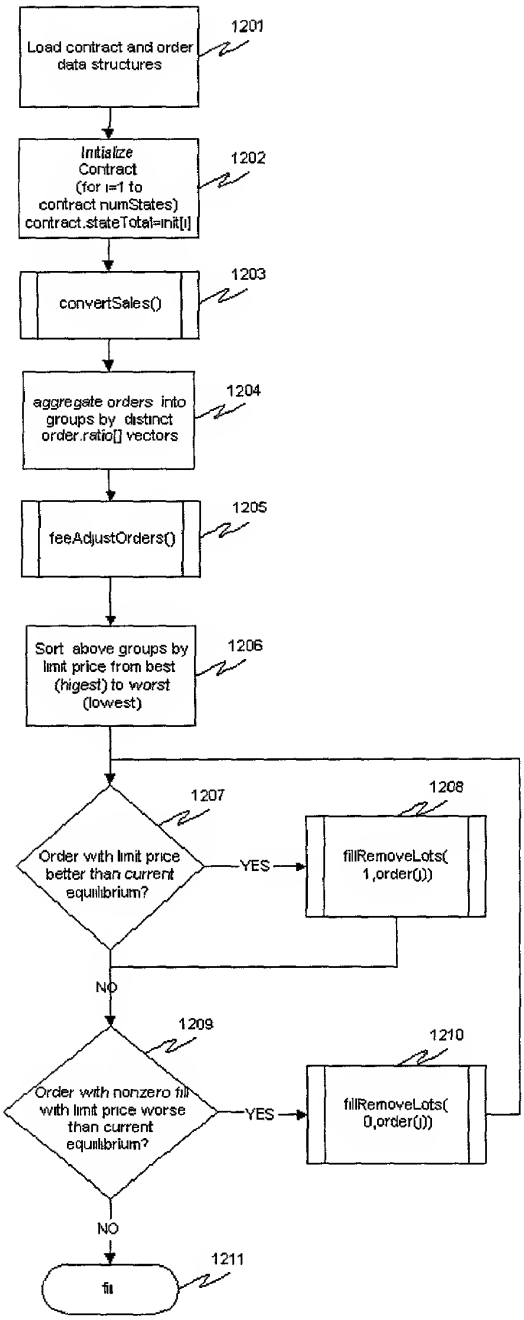

Load contract and order data structures
1201
Initialize Contract (for i=1 to contract.numStates) contract.stateTotal=init[i]
1202
convertSales()
1203
aggregate orders into groups by distinct order.ratio[] vectors
1204
feeAdjustOrders()
1205
Sort above groups by limit price from best (higest) to worst (lowest)
1206
Order with limit price better than current equilibrium?
1207
YES
fillRemoveLots(1,order())
1208
NO
Order with nonzero fill with limit price worse than current equilibrium?
1209
YES
fillRemoveLots(0,order())
1210
NO
fii
1211

FIG. 13

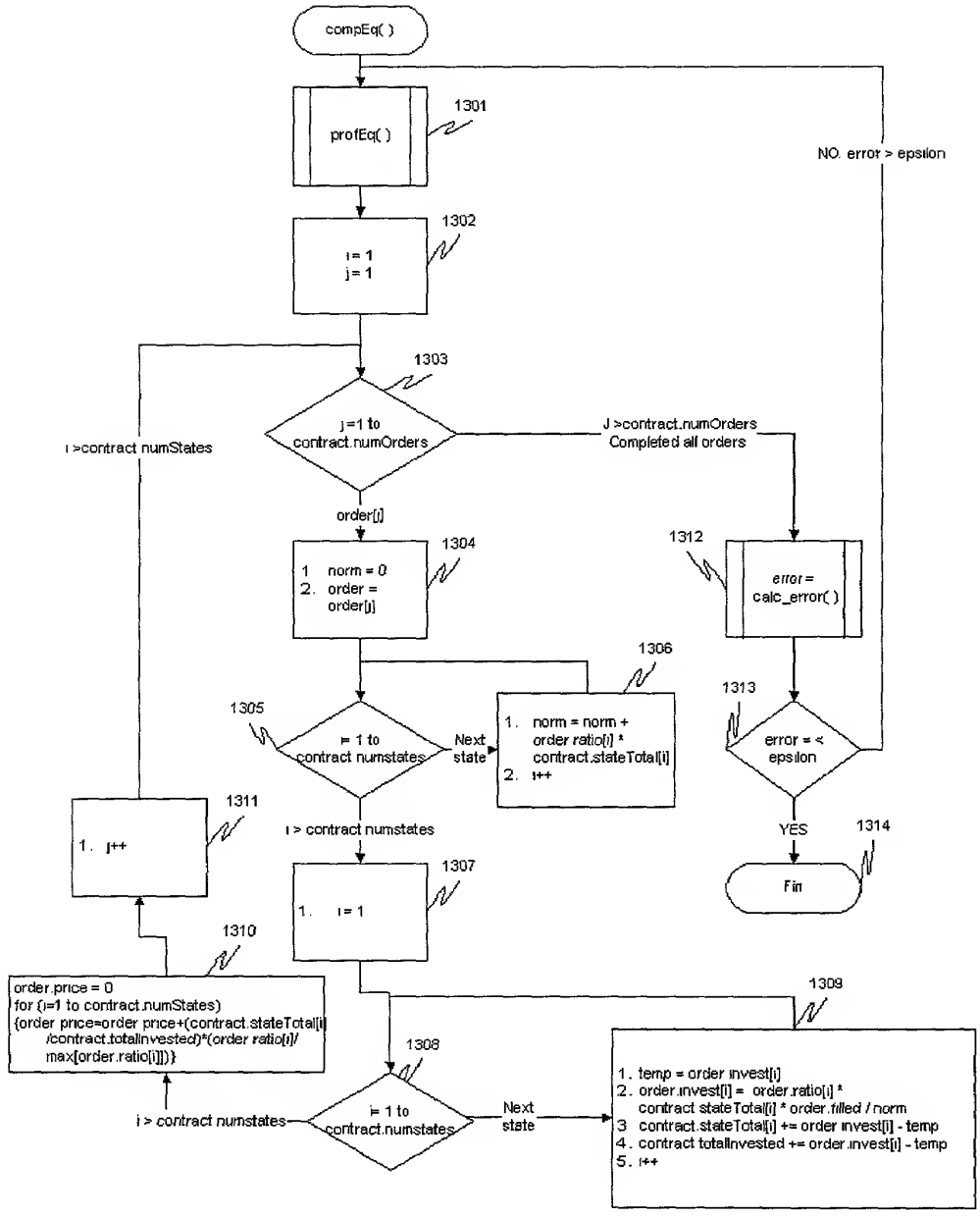

compEq( )
profEq( )
1301
NO. error > epsilon
1302
i = 1
j = 1
1303
j=1 to
contract.numOrders
i >contract.numStates
J >contract.numOrders
Completed all orders
order[j]
1304
1. norm = 0
2. order =
order[j]
1312
error =
calc_error( )
1306
1305
i= 1 to
contract.numstates
Next
state
1. norm = norm +
order.ratio[i] *
contract.stateTotal[i]
2. i++
1313
error = <
epsilon
YES
1314
Fin
1311
1. j++
i > contract.numstates
1307
1. i = 1
1310
order.price = 0
for (i=1 to contract.numStates)
{order.price=order.price+(contract.stateTotal[i]
/contract.totalInvested)*(order.ratio[i]/
max[order.ratio[i]])}
1309
1308
i > contract.numstates
i= 1 to
contract.numstates
Next
state
1. temp = order.invest[i]
2. order.invest[i] = order.ratio[i] *
contract.stateTotal[i] * order.filled / norm
3. contract.stateTotal[i] += order.invest[i] - temp
4. contract.totalInvested += order.invest[i] - temp
5. i++

FIG. 14

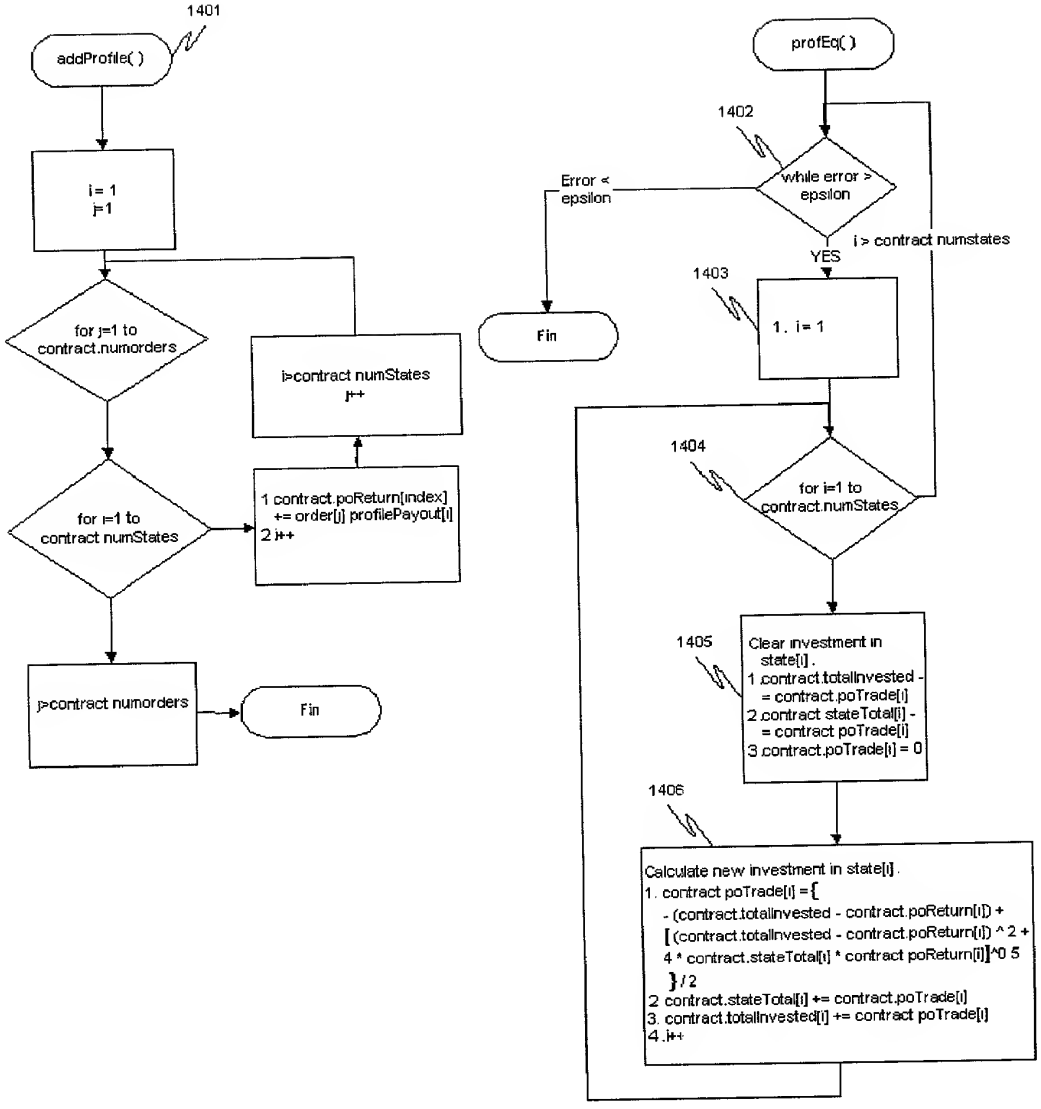

1401
addProfile( )
i= 1
j=1
for j=1 to contract.numorders
for i=1 to contract numStates
1 contract.poReturn[index] += order[j] profilePayout[i]
2 i++
i>contract numStates
j++
j>contract numorders
Fin
profEq( )
1402
while error > epsilon
Error < epsilon
Fin
i > contract numstates
YES
1403
1. i = 1
1404
for i=1 to contract.numStates
1405
Clear investment in state[i] .
1 contract.totalInvested - = contract.poTrade[i]
2 contract stateTotal[i] - = contract poTrade[i]
3 contract.poTrade[i] = 0
1406
Calculate new investment in state[i] .
1. contract poTrade[i] ={
- (contract.totalInvested - contract.poReturn[i]) +
[(contract.totalInvested - contract.poReturn[i]) ^ 2 +
4 * contract.stateTotal[i] * contract poReturn[i]]^0 5
} / 2
2 contract.stateTotal[i] += contract.poTrade[i]
3. contract.totalInvested[i] += contract poTrade[i]
4 .i++

FIG. 15

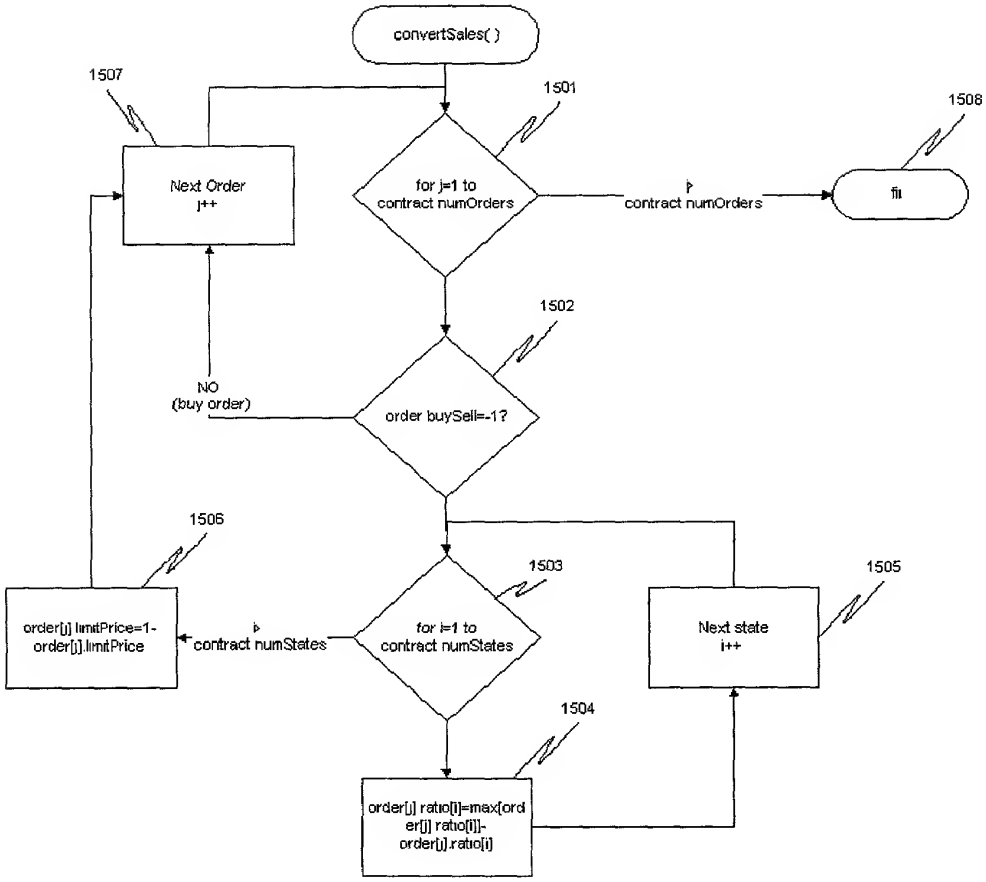

convertSales( )
1507
1501
1508
Next Order
j++
for j=1 to
contract numOrders
contract numOrders
fil
1502
NO
(buy order)
order buySell=-1?
1506
1503
1505
order[j].limitPrice=1-
order[j].limitPrice
contract numStates
for i=1 to
contract numStates
Next state
i++
1504
order[j].ratio[i]=max[ord
er[j].ratio[i]]-
order[j].ratio[i]

FIG. 16

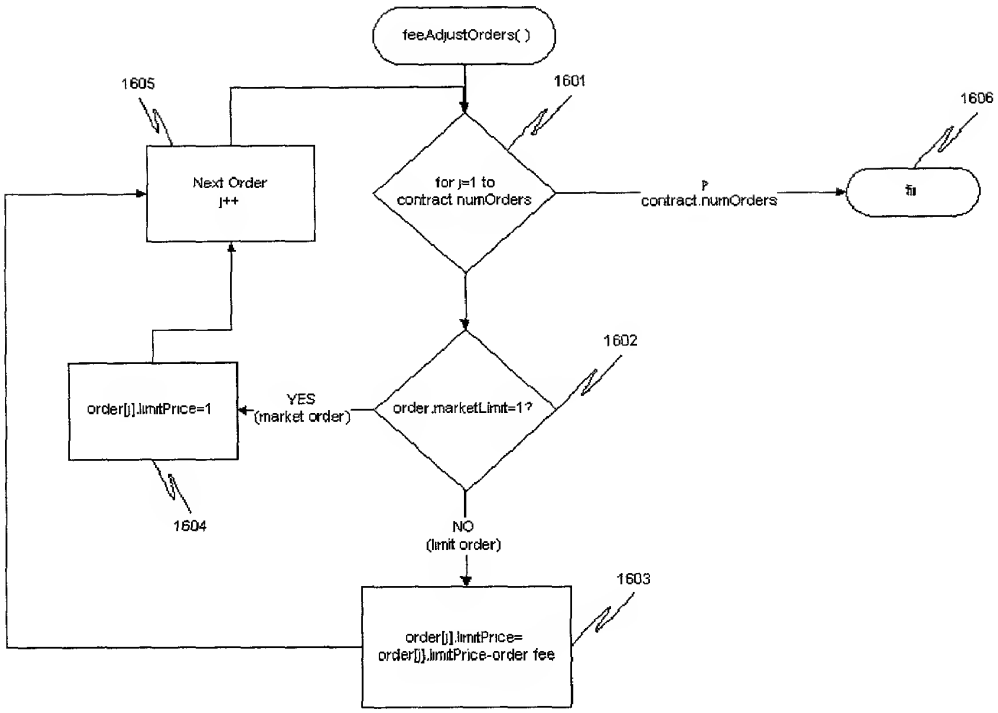

feeAdjustOrders( )
1605
1601
1606
Next Order
j++
for j=1 to
contract.numOrders
F
contract.numOrders
1602
order[j].limitPrice=1
YES
(market order)
order.marketLimit=1?
1604
NO
(limit order)
1603
order[j].limitPrice=
order[j].limitPrice-order fee

FIG. 17

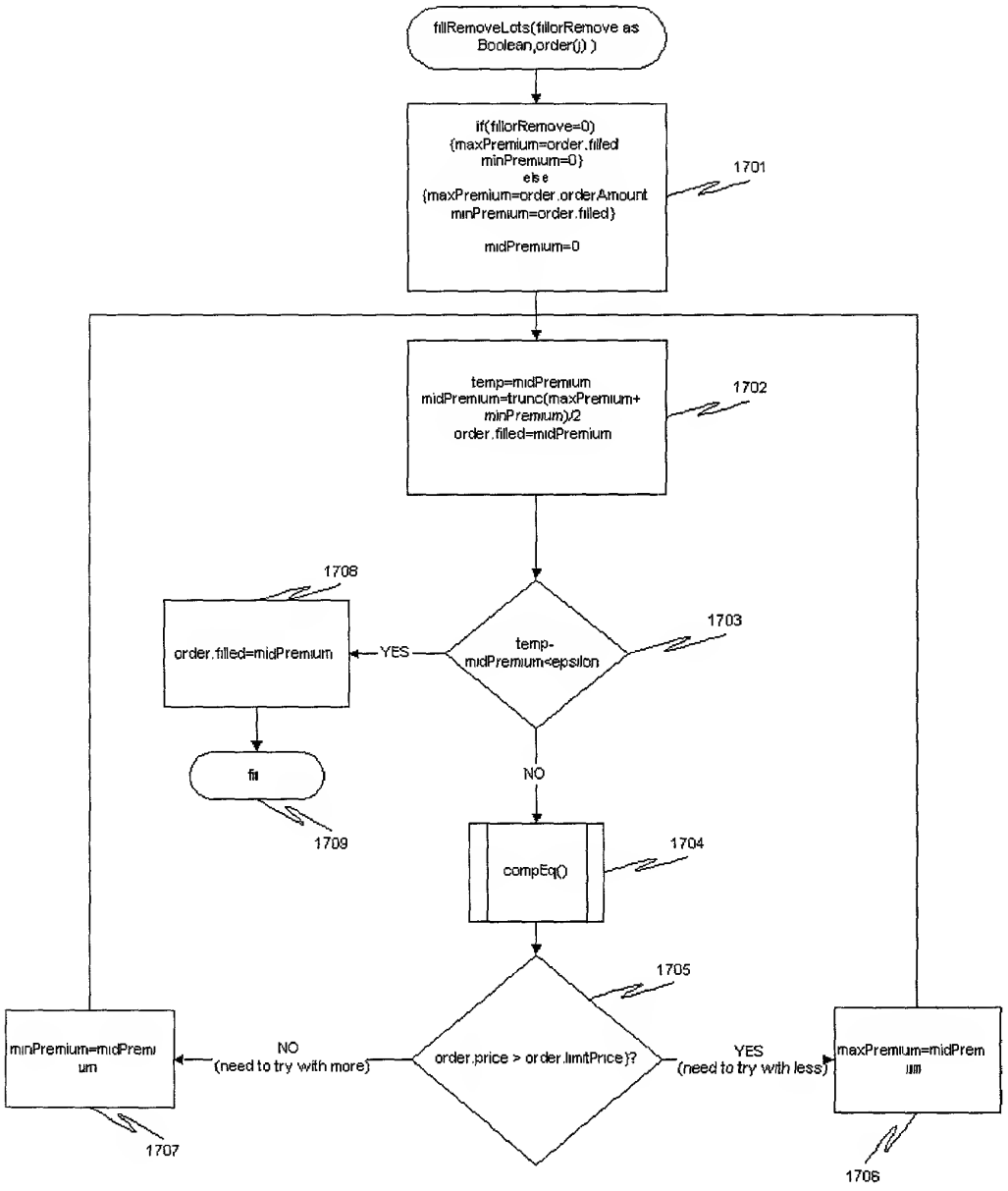
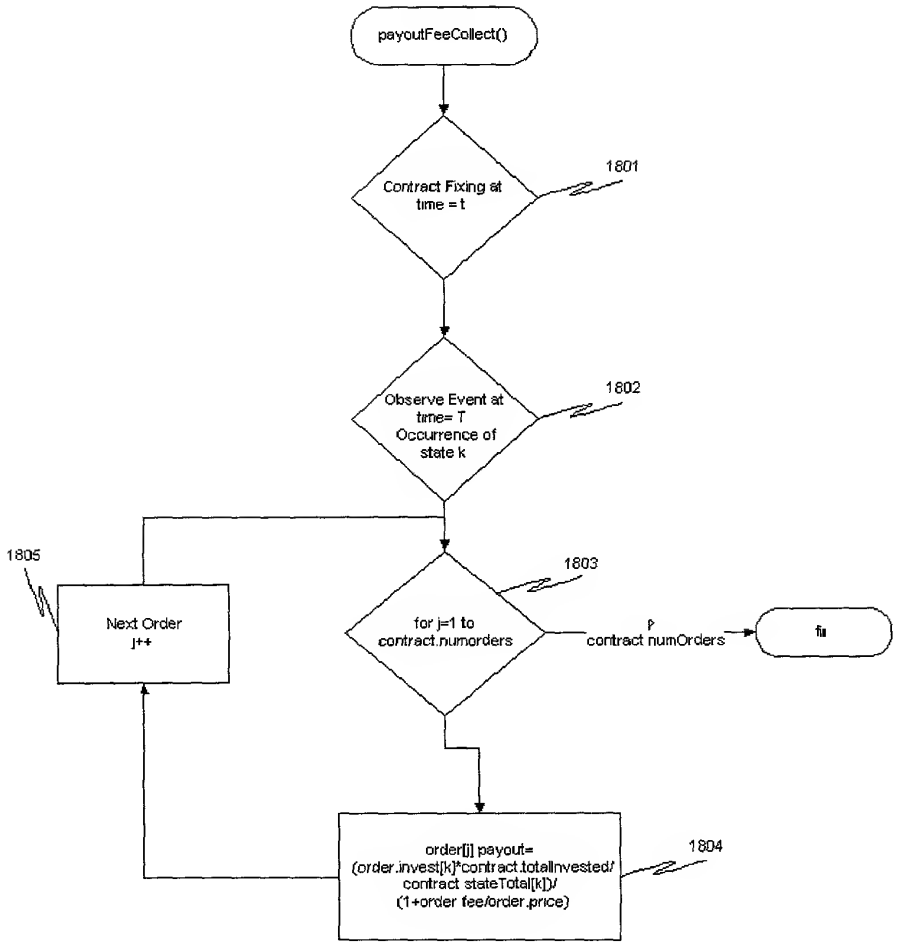

fillRemoveLots(fillorRemove as Boolean,order(j))
if(fillorRemove=0) {maxPremium=order.filled minPremium=0} else {maxPremium=order.orderAmount minPremium=order.filled}
midPremium=0
1701
temp=midPremium
midPremium=trunc(maxPremium+minPremium)/2
order.filled=midPremium
1702
temp-midPremium<epsilon
1703
YES
order.filled=midPremium
1708
fi
1709
NO
compEq()
1704
order.price > order.limitPrice)?
1705
YES (need to try with less)
maxPremium=midPremium
1706
NO (need to try with more)
minPremium=midPremium
1707

FIG. 18


payoutFeeCollect()
Contract Fixing at time = t
1801
Observe Event at time= T Occurrence of state k
1802
1805
Next Order j++
1803
for j=1 to contract.numorders
contract.numOrders
order[j] payout= (order.invest[k]*contract.totalInvested/ contract stateTotal[k])/ (1+order fee/order.price)
1804